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*Genetic Psychology: an Introduction to an Objective and Genetic View of Intelligence.* By E. A. KIRKPATRICK. New York, The Macmillan Co., 1909. pp. xv., 373.

"In working out the general principles of mental genesis it was found that the more specific problem of mental phenomena as organized in individual minds could not be satisfactorily treated till the general truths of organic activity and of mental genesis had been formulated, and that space would not admit of the treatment of both in a single volume. The author hopes to treat of mental development in individuals and some of the pedagogical implications in a subsequent volume." The present work, which may thus be considered as the first volume of a complete Genetic Psychology, contains eleven chapters. Chapter i., Introduction, discusses the nature and scope of genetic psychology, the general characteristics of organisms, evolution and the genesis of behavior and of mind, the psychical factor in behavior. Chapter ii. treats of the structural basis of behavior, and Chapter iii. of types of animal behavior. Chapters iv. and v. consider instinct, that is, complex behavior characteristic of species, and the acquisition of habits and ideas, that is, the behavior of individuals; and Chapter vi. sets forth the structures concerned in complex behavior and in ideation. Chapter vii., Consciousness, discusses the objective and subjective criteria of consciousness, and the probable general characteristics of the consciousness of animals; Chapter viii. characterizes some specific conscious states (pain, intellectual states, volitional activity). Chapters ix. and x. deal with types of adaptive activity or intelligence, and types of learning activity; and the concluding Chapter xi. outlines the general theory and principles of racial and individual development.

The work originated in lecture-courses given to summer students at Columbia and Chicago universities, and parts of it have been read as lectures in a normal school. In origin and plan of treatment, the author says, pedagogical interest has played a large part. "It is probable, also, that popular interest is great enough to make the book acceptable to the more serious of those interested in animal behavior." On the scientific side, "it is hoped that this tentative formulation of the truths supplied by various sciences may help to promote more harmony of effort on the part of the workers in the several related fields."

However, as a scientific work, the *Genetic Psychology* cannot compare with Washburn's *Animal Mind*. Probably, indeed, the author would resent the comparison. It seems fairer to consider the book as a frankly popular work, intended to catch the interest of the beginning student and of the general educated public, and to lead on beyond itself to a strictly scientific interest in the problems of mental development. If we regard it in this way, we have a readable work, logically planned, and kept almost always at the level of common-sense intelligence, so that it may be understood without effort. Interest is maintained by illustrations, anecdotes and examples; and that the interest may at once find sustenance, a selected bibliography of easily accessible sources is appended to every chapter.

If we apply scientific standards, on the other hand, the author must be convicted of looseness of argument and over-hasty generalization. Take, for instance, the concrete case by which he seeks to demonstrate the mode of operation of natural selection (p. 9). "Why are not sparrows as large as geese or as small as flies instead of being just about the size they are? After a severe storm a large number of sparrows were picked up in a helpless condition and as many as possible resuscitated. All were then weighed and measured to determine

the size and proportion of parts. It was found that nearly all that varied to any considerable degree from the average were dead, while most of those near the average in all respects were alive. This of course means that a certain size and proportion of parts are most favorable for a sparrow living in this climate, and that those birds that vary the most from the normal are likely to be destroyed and produce few or no descendants. In a different environment or living a different life, the size and proportion of parts of the sparrow might be different, but in any case environment determines through natural selection the size of sparrows living in a certain way in a certain place." We notice, first of all, that no definition is given of a 'part', and that the 'average' used is not specified; however, it is probable that external measurements only were made, and that the average is the arithmetical mean. We notice, secondly, the implication that sparrow size and sparrow proportion of parts may differ in different environments and with different modes of life; the implication is left vague, without reference to the facts of variation; so that the thoughtless reader might actually conceive of sparrows, in some outlandish quarter of the world, as large as geese or as small as flies. These are minor points of criticism. It is more important to note that the argument as a whole is unsound. Once sparrow-size has been fixed (whether by the direct action of environment, by the operation of natural selection, by intrinsic laws of growth, or by any other causal agency or combination of causal agencies), then deviation from the normal will probably bring with it a constitutional weakness; over-large sparrows, *e.g.*, may have too small hearts, over-small sparrows may have an inadequate musculature, and so forth. The experiment brings no evidence whatsoever that "a certain size and proportion of parts are most favorable for a sparrow living in this climate"; it brings no evidence, that is, that a sparrow as large as a robin (if such a bird existed) could not propagate its kind, in the climate referred to, as well as or even better than the existing species; it shows only that, when once size has been fixed, considerable departure from that size, on the part of the individual, means unbalance of the vital functions. The question "why sparrows are not as large as geese or as small as flies" is not touched; the illustration proves, at most, that a size once fixed is maintained.

The passage quoted continues as follows: "What is true of the size of the sparrow is true of all his other characteristics, including his behavior; for if he attempted to do what his structure does not fit him to do, he would be at a disadvantage and would be eliminated by natural selection." Yet on p. 11 we read of "changes in the mode of behavior of different groups of the common species, which *necessitated corresponding changes in structure*" (italics not in original). Slips of this sort are not uncommon.

Consider again the following passages. "In studying the structure and behavior of various types of organisms we must interpret them as means of survival for the individual or for the species" (p. 10); "it is reasonable to suppose that this [consciousness] *like all other characteristics of organisms*, is the product of natural selection, and that it has been preserved in certain kinds of behavior of certain organisms because it has proved useful" (pp. 13 f.; italics not in original). Yet the biologists themselves are tending more and more to emphasize the occurrence of non-adaptive variations. And apart from the question of the all-sufficiency of natural selection, the author forgets that utility is not a scientific concept. The natural world is a world of causation; and when we have explained in terms of cause and effect, our explanatory task is done. Huxley says somewhere that

the *Origin of Species* appeared to him, as he read it, to give the death blow to teleology in the domain of life-phenomena. Teleology has, unfortunately, come to life again, and flourishes all too abundantly in the pages of this book.

The treatment of consciousness is vacillating (13 f., 190 f., 257 ff., etc.). There is ground for making consciousness a form of energy, and using it as such in causal explanation. It is legitimate also to adopt the working principle of parallelism, and to leave consciousness out of account in dealing with the material world of physics and physiology. Both positions are defended by competent psychologists, and both have weighty arguments in their favor. The author takes a sort of middle course between the two views. Consciousness is the product of natural selection, and has been preserved because it is useful; yet "it is safer not to *assume* conscious states until all the simpler and more demonstrable factors in behavior have been given due weight" (p. 13). Why 'simpler'? Why should consciousness be a complex factor in behavior? "In general, the function of consciousness is not to actually do things but to adjust apparatus for doing them, note the results, and readjust as needed" (p. 205). The function would, then, be simple or complex according as the apparatus are crude or delicate. Cf. p. 178: "in racial development consciousness in the form of rudimentary feeling indicating the necessity or non-necessity of movement may be present momentarily even in the lowest organisms and help to produce more prompt and effective reactions." Here the function of consciousness would be extremely simple; nothing more, in fact, than the saying of Yes or No to a motor impulse.

A final word may be said with regard to the writer's four levels of adaptive activity or 'intelligence'. First in order comes physiological intelligence, shown especially in nutritive and growth processes, and concerned with the direction of activities taking place within the body in such a way as to preserve life. Next follows sensory-motor intelligence, with or without consciousness, directing movements of a part or of the whole body in response to external stimulation in such a way that favorable results may be secured. In the third place stands representative intelligence, of which imagination and memory are characteristic manifestations, making possible economy of movement, ministering to psychical needs, and teaching by way of imitation. Last of all comes conceptual intelligence, which not only makes it possible to accomplish certain purposes more quickly and effectively than by sensory motor or representative intelligence, and to meet new situations which could not be reacted to effectively by any other form of intellectual process, but also enables its possessor to go beyond what can be experienced or even represented. It seems clear that we have, in this hierarchy of faculties, a logical construction of the kind dear to Romanes and his contemporaries, rather than an actual picture of the course of mental evolution.

It is natural for a critic, writing in a technical journal, to estimate the worth of a book from the purely scientific point of view. The present writer can, however, conceive (as he indicated above) that the *Genetic Psychology*, despite all its sins of scientific omission and commission, may serve a very useful purpose as a popular introduction to its subject. Many a student has been attracted to a science by some general treatise, to which he will acknowledge a real debt of gratitude on that account, even though in later years he reject or essentially modify its teaching.

OTTO PERLER.